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ABSTRACT

This digest is intended to be used in conjunction with the text Manual for the Training of United States Fisheries Observers - Atlantic Region. The digest contains five elements: an organization of the training program into sections that allow cumulative learning experience; provides a chronology of these sections to provide optimum coverage and reinforcement of material in the shortest time frame; devises a cost-effective combination of instructors, materials, guest lecturers and field experience; provides a set of objective examinations for the text section; and provides criteria for formal assessment of graduates. (Author)

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Curriculum Digest for the Training of United States Fisheries Observer Corps Atlantic Region

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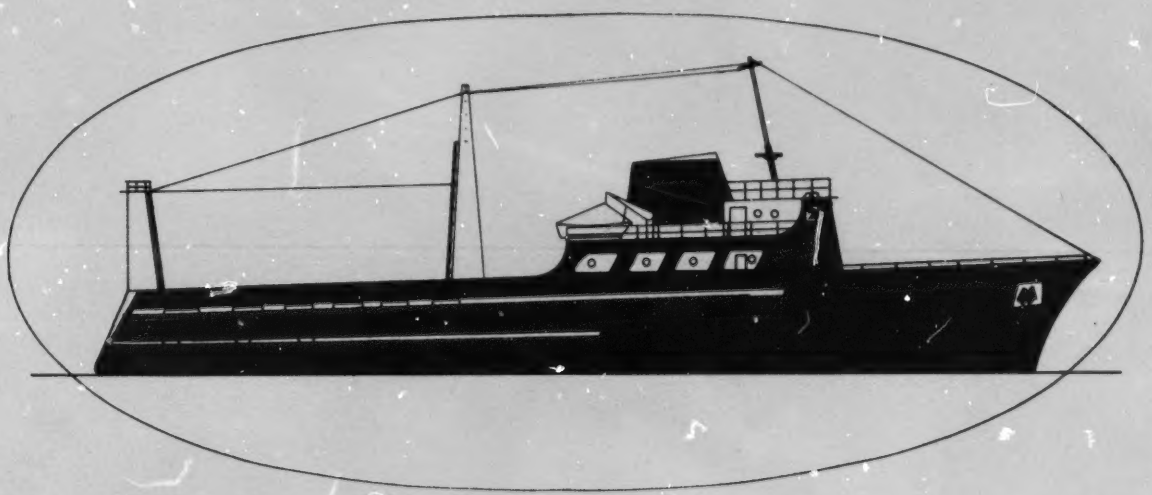
Mark E. Merdinyan
Christine D. Mortimer



Fisheries and Marine Technology
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INTRODUCTION

The following information is to be used in conjunction with the text, Manual for the Training of United States Fisheries Observers - Atlantic Region. This work is intended as a curriculum guide for the purpose of training United States citizens to become Fisheries Observers.

It is assumed that the individual who successfully completes this curriculum and masters the material contained in the training manual will be educated in the duties and responsibilities of fishery observers.

The objectives of this digest are to:

1. Organize the training program into sections that will allow a cummulative learning experience.
2. Provide a reasonable chronology of these sections to provide optimum coverage and reinforcement of the material in the shortest time frame.
3. Devise a cost-effective combination of instructors, materials, guest lecturers and field experiences.
4. Provide a set of objective examinations of appropriate sections to be administered at the designated point in the curriculum.
5. Provide criteria by which a "Formal Assessment Statement" of each program graduate can be made.

FISHERIES OBSERVER TRAINING PROGRAM

Minimum Criteria for Entrance

The history of the United States observer effort shows that qualified and dedicated individuals are hired to carry out the duties and responsibilities of observers. While the criteria for candidacy into the training program will largely be defined by the parent agency (National Marine Fisheries Service) as an ongoing needs assessment of their working observer corps, the Curriculum Development Staff has developed this entire program with the intention that pre-existing exposure to the subject areas is not a prerequisite for entrance and may in fact be an undesirable element.

It has been our intention to address a major concern of the New England Regional Fishery Management Council that the observer effort may be a forum from which to develop and promote meaningful field experience for qualified personnel who possess the potential for projected employment in fisheries management. We have specified the following list of minimum entrance criteria using standard testing measures:

1. Combined S.A.T. or G.R.E. scores for Math and Verbal sections of ONE THOUSAND (1000) or
2. MILLER ANALOGIES - Raw Score of forty-five (45) or
3. Earned Associates or Bachelors degree from an accredited institution.

This list is purposely brief because it is intended that the greatest possible latitude be considered in the backgrounds of the observer candidates. As implied earlier, it is not in the best interests of the observer effort to acquire high concentrations of people who have a common area of expertise.

Subjective estimates of ability, commitment and compatibility are important when considering observer candidates. The instructor group may wish to become appraised of the subjective areas of candidate aptitude during individual counseling or group discussion. However, no structured format for this type of assessment will be offered in this digest.

Criteria for Formal Statement of Assessment

The content and duration of this program requires a significantly high degree of sustained effort on the part of the candidate. The fact that candidates are not to have uniform education and experiential backgrounds further reinforces the amount of work necessary to master the materials and acclimate elements of a marine oriented lifestyle in four short weeks.

Considering the parameters of this new occupational field, it becomes apparent that a graduate level response is required similar to the five or six week summer courses offered at colleges and universities across the country. It is not to be inferred from this statement that only bonafide graduate students should partake in the program. Quite the opposite is the case as documented in this curriculum digest. However, one may borrow certain elements from the "graduate" metaphore when wishing to develop meaningful criteria for assessment of a candidate's performance. It is expressly stated then that the following factors must be made known to the instructor group at large and the candidate body upon the initiation of the program:

Criteria for Formal Statement of Assessment

1. Each Candidate must possess a MEAN score of 85 - (B level work) for all objective examinations at the termination of the program AND

2. Each candidate must be found subjectively suitable to the duties and responsibilities of the observer corps by the consensus opinion of the instructor group before certification of successful completion of the training program can be forwarded to the implementation agency (NMFS).

This type of administrative structure will afford the candidate the greatest possible security in determining competence in this unique area. The instructional group will also benefit by doing justice to the students while fostering a high percentage of placement with the implementation agency.

A formal written statement of assessment shall be drawn up by the instructional group, signed by its membership (in entirety) and placed on permanent file. Copies of this statement must be forwarded to the federal implementation agency for each program graduate no later than five (5) working days from the final day of any specific execution of the program. The federal agency shall have the privilege to review any information concerning the candidates while in the training phase and thereafter. For this reason, the establishment of an active file for each candidate must be a high priority for any instructional group. Naturally, established files for preceeding graduates will become the property of any succeeding bonafide instruction group.

FISHERIES OBSERVER TRAINING PROGRAM

Curriculum Format

The following chronology has been devised to provide optimum coverage and reinforcement of the training materials in the shortest realistic time frame. A distribution of the instructional components also follows to provide an integrated understanding of this currivulum.

CHRONOLOGY

W E E K I

Monday

0800 - 0900	Introduction - Program Objectives, Student Orientation and Outline of Administrating Procedures as given in Curriculum Digest.
0900 - 1000	History - F.C.M.A. and Other Unilateral Regulatory Mechanisms.
1000 - 1100	Regulations - Fisheries Management Plans (F.M.P.S.) for Directed Fisheries - Atlantic Region.
1100 - 1200	Seamanship Terminology - Examination of Nautical Language Requirement of Foreign Fisheries Observers.
1300 - 1600	Biological Section - Anatomical Considerations.

Tuesday

0800 - 1200	Language Section - Specialized Berlitz Program.
1300 - 1600	Biological Section - Anatomical Considerations.

Wednesday

0800 - 0900 Fishing Gear - Consideration of Objects, Methods and Vertically Integrated Process.

0900 - 1000 History - F.C.M.A.

1000 - 1100 Regulations - F.M.P.S.

1100 - 1200 Guest Lecturer - Executive Director - Regional Fisheries Management Council

1300 - 1600 Biological Section - Anatomical Considerations.

Thursday

0800 - 1200 Language Section - Specialized Berlitz Program

1300 - 1600 Biological Section - Anatomical Considerations

Friday

0800 - 0900 Fishing Gear

0900 - 1000 History - F.C.M.A.

1000 - 1100 Regulations - F.M.P.S.

1100 - 1200 Seamanship Terminology

1300 - 1600 Biological Section - Anatomical Considerations

Saturday

Field Experience One - U.S. Coast Guard Station

Otis Air Force Base - Air Reconnaissance

W E E K I I

Monday

0800 - 0900 Fishing Gear

0900 - 1000 History - F.C.M.A.

1000 - 1100 Regulations - F.M.P.S.

Monday (Continued)

1100 - 1200 Seamanship Terminology

1300 - 1600 Biological Section - Species Identification

Tuesday

0800 - 1200 Language Section - Specialized Berlitz Program

1300 - 1600 Biological Section - Species Identification

Wednesday

0800 - 0900 Fishing Gear (Film)

0900 - 1000 History - F.C.M.A.

1000 - 1100 Regulations - F.M.P.S.

1100 - 1200 Guest Lecturer - Lt. Calvin Perkins, USCG

1300 - 1600 Biological Section - Species Identification

Thursday

0800 - 1200 Language Section - Specialized Berlitz Program

1300 - 1600 Biological Section - Species Identification

Friday

0800 - 0900 Fishing Gear

0900 - 1000 History - Examination

1000 - 1100 Regulation - F.M.P.S.

1100 - 1200 Seamanship Terminology

1300 - 1600 Biological - Species Identification

Saturday

Field Experience Two - U.S. Coast Guard - Sea Surveillance Patrol and Enforcement Procedures Orientation

W E E K I I I

Monday

0800 - 0900	Fishing Gear
0900 - 1000	Subjective Assessment Period
1000 - 1100	Regulations - F.C.M.A.
1100 - 1200	Seamanship Terminology
1300 - 1600	Biological Section - Sampling Techniques

Tuesday

0800 - 1200	Language Section - Specialized Berlitz Program
1300 - 1600	Biological Section - Sampling Techniques

Wednesday

0800 - 0900	Fishing Gear - Technology Assessment and Projected Course of Development
0900 - 1000	Subjective Assessment Period
1000 - 1100	Regulations - F.M.P.S.
1100 - 1200	Guest Lecture - Basic Navigation - Loran, RDF, Fathometer, Compass, Chartwork
1300 - 1600	Biological Section - Sampling Techniques

Thursday

0800 - 1200	Language Section - Specialized Berlitz Program
1300 - 1600	Biological Section - Sampling Technique

Friday

0800 - 0900 Fishing Gear

0900 - 1000 Subjective Assessment Period

1000 - 1100 Regulations - F.M.P.S.

1100 - 1200 Seamanship Terminology
Review and 30 min. Exam.

1300 - 1600 Biological Section - Sampling Techniques

Saturday

Field Experience III - Domestic Fishing Trip (Optimal Date)

W E E K I V

Monday

0800 - 0900 Fishing Gear - Review

0900 - 1000 Subjective Assessment Period

1000 - 1100 Regulations - Seminar

1100 - 1200 Seminar - Mandatory Reference Material

1300 - 1600 Biological Section - Biodata Recording

Tuesday

0800 - 1200 Language Section - Review of Specialized Berlitz Program

1300 - 1600 Biological Section - Biodata Recording

Wednesday

0800 - 0900 Fishing Gear - Examination (40 min.)

0900 - 1000 Subjective Assessment Period

1000 - 1100 Regulations - Seminar and Review

Wednesday (Continued)

1100 - 1200 Guest Lecturer - Operations Officer - National Marine Fisheries Services, Otis Air Force Base - Observer Program

1300 - 1600 Biological Section - Biodata Recording

Thursday

0800 - 1200 Language Section - Two Hour Examination (Oral and/or Written). Last Two Hours used to Demonstrate Electronic Language Aids - Lexicon and Craig Units.

1300 - 1600 Biological Sections - Biodata Recording

Friday

0800 - 0900 Federal Communications Commission - Test for Third Class Radiotelephone Operators License. To be administered by F.C.C. at Training Facility.

0900 - 1000 Subjective Assessment Period or General Roundtable Discussion of Program.

1000 - 1200 Regulations - F.M.P.S. Examination (Two Hour)

1300 - 1500 Biological Section - Biodata Recording

1500 - 1600 Restatement of Program Objectives

Saturday

Field Experience IV - Woods Hole, N.M.F.S., Fisheries Laboratory-Observer Generated Biodata Analysis or Alternate Date for Domestic Fishing Trip.

The preceding chronology would naturally remain subject to adjustment depending on such factors as weather conditions, availability of visiting speaker etc.

TABLE - DISTRIBUTION OF INSTRUCTION TIME (IN HOURS) PER SESSION -- FISHERIES OBSERVER TRAINING PROGRAM.

	SECTIONS	WEEK 1	WEEK 2	WEEK 3	WEEK 4	TOTALS	% (OF INST.TIME
1.	Fishing Gear	2	3	3	2	10	7
2.	History FCMA	3	3	0	0	6	4
3.	Seamanship Terminology	2	2	2	0	6	4
4.	Foreign Fishing Regulations	3	3	3	4	13	9
5.	Language Training	8	8	8	8	32	23
6.	*Biodata Recording & Species Identification	15	15	15	15	60	43
7.	Guest Lecturers	1	1	1	1	4	3
8.	Counseling - Subjective Assessment	-		3	3	6	7
9.	Field Experiences & Fishing Trip	1 (Day)	1 (Day)	1 (Day)	1 (Day)	4 (Days)	NA
10.	Miscellaneous	1 (Intro)			1 (Radio-) (tele-) (phone) (Exam) 1 (Seminar-) (Mandatory) (Reference) (Material)	3	2

*To include Lecture, Lab and Training Vessel Experience.

TOTAL	35	35	35	35	35	140

PLUS (4) SATURDAY FIELD EXPERIENCES.

FISHERIES OBSERVER TRAINING PROGRAM

Mandatory Reference Material

While directed reference resources are presented in the respective sections of this curriculum manual, the instructor is to notify the candidates at the beginning of the program that the material listed below is to be completely read by the conclusion of the program. The documents listed here are important and should be familiar to the candidates from the rationale that they will come in contact with these documents again in their careers as observers.

It is felt that testing of these materials is not necessary, however, the instructor group may elect to do so if there is evidence that the material is not being assimilated out of class. The final decision is, therefore, left to the discretion of the instructor group.

I. Manual for Observers Aboard Foreign Fisheries Vessels, Part I - Operations Procedure.

Note is taken that the above reference was first issued to working observers in 1977. Therefore, the following agency should be contacted to supply updated information:

Foreign Fisheries Observer Program
Fisheries Management Division
Law Enforcement Branch
Otis Air Force Base
Bourne, MA

2. Fisheries Conservation and Management Act of 1976, Public Law 94-265. Included in the Manual Text.

3. Federal Communications Commission - Special Study Guide and Reference Material for Examination for Radiotelephone Third Class Operator Permit for Operation in Maritime Services. Instructors should request quantity and updated materials from:

United States Coast Guard
First C.G. District-Communications
150 Causeway Street
Boston, MA

INSTRUCTOR NOTE

Special note is made here that out-of-class review of the materials for licenses resulting in the successful passage of the license exam and presentation of the license to the instructor group at the end of the training program is a prerequisite for successful completion of the program.

FISHERIES OBSERVER TRAINING PROGRAM

List of Guest Lecturers

For the purpose of adding vital current information to any execution of a program in observer training, the following individuals with their areas of expertise are offered here. Because the international fishing community is exhibiting rapid change, this opportunity for valid input is felt to be a most desirable element.

GUEST SPEAKERS	EXPERTISE
Executive Director New England Regional Fisheries Management Council	Fisheries Management and Current Development
Executive Director Mid-Atlantic Regional Fisheries Management Council	Fisheries Management and Current Developments
Executive Secretary Atlantic Offshore Fish and Lobster Association	Fisheries Regulations and Domestic Fishermans Point of View
Lt. Calvin Perkins U.S. Coast Guard 150 Causeway Street Boston, MA	Enforcement Procedures and Protocol
Prof. Xavier Cameron University of Rhode Island Department of Geography and Marine Affairs	Fisheries Regulations and Management Schemes
Special Agent James Medeiros Building 5201 Otis Air Force Base Bourne, MA	NMFS Observer Program Director
Mr. John Foster Director, Fisheries Technology Division Nordco, St. John's Newfoundland, Canada	International Fishing Gear Specialist
Mr. Hugh F. O'Rourke Executive Secretary Boston Fisheries Association, Inc. 253 Northern Avenue Boston, MA	Fisheries Regulations, Domestic fisheries economics

INTEGRATED FIELD EXPERIENCES

FISHERIES OBSERVER TRAINING PROGRAM

In an effort to provide the most cost-effective training program encompassing many of the "realities" of the contemporary international fishing industry, a series of field experiences are provided. While the sponsoring organization offering future training programs may find it expedient to go to alternate locations, the list below is rank ordered by actual observation of its educational value to observer trainees. The first four locations are considered highly significant. Appropriate timing for field experiences is provided in the curriculum format.

FIELD EXPERIENCE	FUNCTION(to Observer Trainee)
United States Coast Guard Station Cape Cod-Otis Air Force Base c/o LCDR. LYNCH 617-563-7111	Air Reconnaissance of Northwest Atlantic Fisheries Conservation Zone.
United States Coast Guard First C.G. District-Commander 150 Causeway Street Boston, MA 617-223-3603	Sea-enforcement procedure communications and boarding protocol; vessel functions and capabilities.
OR	
Maritime Law Enforcement Branch Commander (AOL) U.S.C.G. ATLANTIC AREA Governors Island, NY 212-264-0644/0645	Sea- enforcement procedure communications and boarding protocol; vessel functions and capabilities.
Woods Hole N.M.F.S. Laboratories, NOAA Ship "ALBATROSS IV" MBL, Woods Hole Oceanographic Institute	Observer data analysis and significance of scientific approach to stock assessment.

New England Regional Fishery Management Council Meeting Peabody Office Building 1 Newbury Street Peabody, MA 617-535-5450	Fisheries policy development; commercial fishermens forum for grievances
New Bedford Fish Pier and Auction New Bedford, MA	Domestic fishing industry stratification and historical significance; frame of reference when dealing with international fishing effort.
Local Fishermens' Association Meetings-i.e. Point Judith Fishermens' Co-Operative Assoc.	
Maine Fishermens' Co-Operative Assoc.	
Atlantic Off-Shore Fish & Lobster Association	
Booth Fisheries, Inc. c/o Mr. Clinton Davis Portsmouth, NH	Self explanatory - Large scale processing of internationally caught marine protein.
Gorton's of Gloucester, Inc. Gloucester, MA	Self explanatory - Large scale processing of internationally caught marine protein.

It is suggested that field experiences to these locations take precedence over other domestic locations. Further, the nominal time spent for one field experience, should be limited to three hours at the site. Most of the organizations listed above have been appraised that their groups may be called on to host groups of observer trainees on field trips. A courtesy notice of possible dates and numbers of trainees attending would facilitate future communications regarding field experiences.

FISHERIES OBSERVER TRAINING PROGRAM

List of Domestic Fishermen

Agencies responsible for future observer training programs are advised that it is considered essential that trainees be exposed to actual experiences aboard domestic fishing vessels. The purpose as stated in the students' training manual is two-fold. Firstly, the student is exposed to the complex problems facing domestic fishermen while hearing their point of view first hand. The second is that the domestic people become aware of the responsibilities of an observer and feel that they have a voice in the management process. The greatest benefit to the observer trainee is in gaining a perspective, while the fisherman ultimately benefits from the public relations.

The list of captains and vessels that follows represents a group of positive respondents to a mailing for willingness to participate in domestic fishing activities with observer trainees. A phone call to these individuals will be all that is necessary to reopen lines of communication. Lead time of 30 days should be sufficient notice to active fishing captains.

Captain/Owner	Vessel
1. Capt. Richard B. Allen 1735 Drift Road Westport, MA (617) 636-3276	Jennie and Jackie 55' - steel

	Captain/Owner	Vessel
2.	Capt. William I. Bomster 16 Lockwood Drive Clinton, CT (203) 669-2038	Zebu 95' - steel
3.	Capt. Joseph Dolan New Bedford, MA (203) 453-3880	Two fishing vessels
4.	Capt. Bill Hallsen New Bedford, MA (617) 337-1989	Barbara Christine 65' - steel
5.	Capt. T. Jordan Portland, ME (207) 781-2247	dragger 70' - wood
6.	Capt. Peter M. Mahoney 26 Newport Road Hull, MA (617) 925-3100	42' - wood
7.	Capt. Jim McCauley Peace Dale, RI	Alliance 86' - steel
8.	Capt. Alphonse Santo Gloucester, MA (617) 283-2158	Antonina
9.	Capt. Steve Thivobeau Five Island, ME (207) 371-2166	Theresha
10.	Capt. Sherman Thompson P.O. Box 867 Kennebunkport, ME (207) 967-3064	Annie Jay 55'

TOPIC: Objective Examination - Seamanship Terminology

CHRONOLOGY: To be administered after consideration of the section; on approximately the _____ day.

DURATION: 30 minutes

ACCEPTABLE PERFORMANCE LEVEL 90% (1.5 wrong)

STUDENT NO: _____

EXAM GRADE: _____

DIRECTIONS: Answer all of the questions below in the manner indicated (i.e. define the term; multiple choice, fill-in the blank etc..) Work as rapidly as possible. Print all answers.

1. BRIDLE:

2. SNATCH BLOCK:

3. A solid fence-like barrier along the edge of weather decks is a _____.

4. A BLOCK is a device consisting of a _____ enclosed in a _____ through which a _____ or _____ is passed through.

5. The opposite of amidships is _____.

6. Complete the word which ends in YARD which means that a light line or piece of twine is made fast to an object to hold that object as a security or convenience measure. _____

7. A fathom is a unit of _____ and is equal to _____ft.

8. Draft and Displacement describe certain features of a vessel. Define each.

9. The distance from the waterline to the first continuous deck is called _____.

10. Foc's'le is an abbreviation for the word forecastle. Where is this compartment located?

11. The lay of a warp or rope is the _____
_____

12. The term KNOT is a unit of _____

a. distance
b. speed
c. depth
d. time

13. An arrangement of equipment which afford one a "mechanical advantage" in lifting masses of fish or other objects requires <u>two</u> types of equipment. Specify and define.

14. In positioning terminoloy, an observer would expect that when he or she was to board a foreign vessel at sea the launch (transport craft) would approach the vessel on the _____ side. The opposite side of the vessel would then be to _____.

15. On a fishing vessel an opening in the side of the bulwarks at the deck level would be called a _____.

TOPIC: Objective Examination Key - Seamanship Terminology

CHRONOLOGY: To be administered after consideration of the section; on approximately the _____ day.

DURATION: 30 minutes

ACCEPTABLE PERFORMANCE LEVEL 90% (1.5 wrong)

STUDENT NO: _____

EXAM GRADE: _____

DIRECTIONS: Answer all of the questions below in the manner indicated (i.e. define the term; multiple choice, fill-in the blank etc..) Work as rapidly as possible. Print all answers.

1. BRIDLE: A length of rope, chain or wire with both ends secured and the strain taken up in the middle.

2. SNATCH BLOCK: A single sheaved block with side access for easy entrances - exit of warp.

3. A solid fence-like barrier along the edge of weather decks is a BULWARK.

4. A BLOCK is a device consisting of a SHEAVE enclosed in a CASING through which a LINE or WIRE ROPE is passed through.

5. The opposite of amidships is ATHWARTSHIPS.

6. Complete the word which ends in YARD which means that a light line or piece of twine is made fast to an object to hold that object as a security or convenience measure. LANYARD

7. A fathom is a unit of LENGTH OR DEPTH and is equal to SIX feet.

8. Draft and Displacement describe certain features of a vessel. Define each.

   DRAFT: vertical distance from the keel to the waterline.

   DISPLACEMENT: weight of H_2O displaced by the vessel; equal to the weight of the ship.

9. The distance from the waterline to the first continuous deck is called FREEBOARD.

10. Foc's'le is an abbreviation for the word forecastle. Where is this compartment located? Forward section of the weather deck; usually houses crew quarters and galley.

11. The lay of a warp or rope is the DIRECTION of twist in rope (warp) or wire.

12. The term KNOT is a unit of B. SPEED

    a. distance
    b. speed
    c. depth
    d. time

13. An arrangement of equipment which affords one a "mechanical advantage" in lifting masses of fish or other objects requires two types of equipment. Specify and define.

    BLOCK - A sheave in a casing which provides a free-wheeling bearing surface for warp or wire.

    TACKLE - an arrangement of lines which when used in conjunction with block(s) affords mechanical advantage.

14. In positioning terminology, an observer would expect that when he or she was to board a foreign vessel at sea the launch (transport craft) would approach the vessel on the LEE OR LEEWARD. The opposite side of the vessel would then be to WINDWARD.

15. On a fishing vessel an opening in the side of the bulwarks at the deck level would be called a SCUPPER.

TOPIC: Objective Examination - Fishing Gear

CHRONOLOGY: To be administered after consideration of the section; on approximately the _____ day

DURATION: 40 Minutes

ACCEPTABLE PERFORMANCE LEVEL 85% (3 wrong)

STUDENT NO: _____

EXAM GRADE _____

DIRECTIONS: Answer all of the questions below in the manner indicated (i.e. multiple choice, short answer. true-false etc.). Work as rapidly as possible All parts of a question must be answered correctly.

1. The basic unit of mobil gear netting is called the _____.
2. The single boat midwater trawl employs the use of special doors called _____.
3. The use of net floats on a Midwater Trawl is only found along the headrope. T or F
4. Otter or Bottom fishing usually requires the use of doors that are:
   a. taller than wide
   b. longer than wide
   c. longer than tall
   d. none of the above
5. The size of a mesh can be determined by adding the length of two bars. T or F
6. The sweeps found on otter trawls are species specific to some extent. T or F
7. Why is a finfishing net able to support great masses of fish in the codend?

_____

_____

_____

_____

8. The end flag used in the fixed gear fisheries must have two pennants of at least 150 inches square if it is on the _____ end of the trawl.

9. The wings of a net allow for lateral herding of the product. T or F

10. If the "ground" wires of _____ gear appear ferrous or shiny there is reason to believe that the fishing method employed by the vessel has been used illegally under FCMA regulations.

11. List 3 factors that contribute to the height of a midwater trawl in the hydrosphere.

_____

_____

_____

12. Pelagic fish hauled back onboard a foreign midwater trawler would possess these prominent features?

a. same species

b. same year class

c. dead for all intents and purposes

d. none of the above

e. all but selection D

13. From what you know about twine would you expect the mesh size to increase (same net) on a foreign vessel in the conservation zone.

a. yes or no

b. why or why not -

_____

_____

_____

_____

14. While it is not necessary that you know how to knit twine or mend nets, what is meant by the term "Run of the Twine" and what importance does it have?

_____

_____

_____

15. A "gear conflict" concerning foreign and domestic vessels might include what specific gears. List two.

    a.

    b.

16. Foreign vessels in the Northwest Atlantic region use what two gear methodologies predominantly?

    a.

    b.

17. What is the difference between a snood and a bridle in terms of the forces that may be applied to them.

    _____

    _____

    _____

18. Sketch a diagram of an otter trawl from doors to codend and label eight parts correctly (do not count doors and codend).

19. What is the difference between a pickup and a sider in a mesh?

    _____

    _____

    _____

20. Define the two concepts below:

    a. Gear

    b. Trawl

TOPIC: Objective Examination Key - Fishing Gear

CHRONOLOGY: To be administered after consideration of the section; on approximately the _____day.

DURATION: 40 minutes

ACCEPTABLE PERFORMANCE LEVEL 85% (3 wrong)

STUDENT NO: _____

EXAM GRADE: _____

DIRECTIONS: Answer all of the questions below in the manner indicated (i.e. multiple choice, short answer-true or false, etc.) Work as rapidly as possible. All parts of a questions must be answered correctly.

1. The basic unit of mobil gear netting is called the MESH.

2. The single boat midwater trawl employs the use of special doors called SUBERKRUB.

3. The use of net floats on a Midwater Trawl is only found along the headrope. T or (F)

4. Otter or Bottom fishing usually requires the use of doors that are:

   a. taller than wide
   (b) longer than wide
   (c) longer than tall (the best answer)
   d. none of the above

5. The size of mesh can be determined by adding the length of two bars. T or (F) (MUST INCLUDE MESH KNOT WIDTH)

6. The sweeps found on otter trawls are species specific to some extent. (T) or F

7. Why is a finfishing net able to support great masses of fish in the codend?

   THE DISTRIBUTION OF GREATEST MASS ALONG THE "RUN OF THE TWINE" AND THE LATERAL SPREAD OF THE MESHES AT THE SIDERS MAKES IT POSSIBLE FOR RELATIVELY THIN TWINE TO WITHSTAND AND SUPPORT GREAT AMOUNTS OF FISH.

8. The end flag used in the fixed gear fisheries must have two pennants of at least 150 inches square if it is on the WEST OR LONG end of the trawl.

9. The wings of a net allow for lateral herding of the product. (T) or F.

10. If the "ground" wires of MIDWATER MOBILE gear appear ferrous or shiny, there is reason to believe that the fishing method employed by the vessel has been used illegally under FCMA regulations.

11. List 3 factors that contribute to the height of a midwater trawl in the hydrosphere.

    1. VESSEL SPEED THROUGH THE WATER

    2. AMOUNT OF TOTAL GEAR MASS INCLUDING WEIGHTS AND TRANSDUCERS ETC..

    3. AMOUNT OF BUOYANT FORCE SUPPLIED BY NET FLOATS

12. Pelagic fish hauled back onboard a foreign midwater trawler would possess these prominent features?

    a. same species
    b. same year class
    c. dead for all intents and purposes
    d. none of the above
    (e) all but selection D

13. From what you know about twine would you expect the mesh size to increase (same net) on a foreign vessel in the conservation zone.

    a. (yes) or no
    b. why or why not -

    EVEN THOUGH MOST FOREIGN TWINE IS "PRESTRETCHED" CONTINUOUS USE ON DIFFERENT BOTTOMS UNDER DIFFERENT CONDITIONS WOULD ENHANCE STRETCH POTENTIAL.

14. While it is not necessary that you know how to knit twine or mend nets, what is meant by the term "Run of the Twine" and what importance does it have?

BY A PHENOMENON KNOWN AS "RUN OF THE TWINE", THE STRUCTURE OF A MESH WITH ITS PICKUP AND SIDER KNOTS HAS THE GREATEST POTENTIAL FOR SUPPORTING MASS IN THE DIRECTION OF "RUN" OF PICKUPS.

15. A "gear conflict" concerning foreign and domestic vessels might include what specific gears. List two.

a. FOREIGN MOBILE GEAR
b. DOMESTIC FIXED GEAR

16. Foreign vessels in the Northwest Atlantic region use what two gear methodologies predominantly?

a. MOBILE GEAR-OTTER TRAWLING
b. MOBILE GEAR-MIDWATER TRAWLING

17. What is the difference between a snood and a bridle in terms of the forces that may be applied to them.

A SNOOD DISTRIBUTES MASS ALONG THE SHAFT.
A BRIDLE DIVIDES THE MASS ALONG TWO PARTS.
(I.E. LOBSTER TRAP BRIDLES; WING BRIDLE)

18. Sketch a diagram of an otter trawl from doors to codend and label eight parts correctly (do not count doors and codend).

(SEE INSTRUCTIONAL DIAGRAM)

19. What is the difference between a pickup and a sider in a mesh?

A PICKUP IS A LOOP OF TWINE (AROUND WHICH A KNOT IS TIED).
A SIDER IS A KNOT OF WHICH THE CUTTING OF ANY MEMBER WILL DESTROY THE INTEGRITY OF THE MESH.

20. Define the two concepts below:

a. Gear: any configuration of apparatus which produces a marketable product.

b. Trawl: any configuration of gear which when used in conjunction with a vessel produces a marketable product.

TOPIC: Objective Examination - History - F.C.M.A.

CHRONOLOGY: To be administered after consideration of the section; on approximately the _____day.

DURATION: 40 minutes

ACCEPTABLE PERFORMANCE LEVEL 85% (3 wrong)

STUDENT NO: _____

EXAM GRADE: _____

DIRECTIONS: Answer all of the questions below in the manner indicated (i.e. multiple choice, short answer - true or false, etc.). Work as rapidly as possible. All parts of a question must be answered correctly.

International Law and U.S. Extended Jurisdiction

1. The Dutch scholar Hugo Grotius was the most celebrated advocate of the concept of "the dominion of the seas" T or F

2. The first nation to claim a 200 mile fisheries management zone was
   a. Peru
   b. Ecuador
   c. Chile
   d. Paraguay

3. Ecuador's seizure of U.S. shrimp trawlers was a source of friction between the U.S. and Ecuador for over 20 years. T or F

4. The Declaration of Santiago was made by a group of U.S. fishermen whose vessels had been seized by Chile in 1952.

5. The Fishermen's Protective Act of 1954
   a. extended Jones Act protection to fishermen
   b. extended U.S. fishery management to 12 miles from shore
   c. prevented foreign factory fleets from fishing above the U.S. continental shelf
   d. none of the above

6. The Declaration of Panama created a joint maritime policy for Panama, Ecuador, and Chile. T or F

7. The Truman Proclamations of 1945
   a. Firmly extablished the U.S. 3 mile limit
   b. began the movement towards extended resource zones
   c. maintained the neutrality of North and South American coastal waters
   d. established a compensation scheme for U.S. fishermen

8. The Chilean whaling industry is indirectly responsible for the U.S. 200 mile fishery conservation and management zones. T or F

9. Ecuador was the first nation to declare a 200 mile territorial sea in 1946. T or F

10. U.S. tuna fishermen have been assisted by
    a. the Fishermen's Protection Act of 1954
    b. the Declaration of Santiago
    c. a and d
    d. the Fishery Conservation and Management Act of 1976

11. The concept of freedom of the seas was promoted by
    a. John Selden
    b. Pope Pius
    c. Hugo Grotius
    d. a and d

12. The Third United Nations Conference on the Law of the Sea is only involved with the issue of deep seabed mining. T or F

13. The ICNT has become a binding agreement in international law and has limited the growth of the enclosure movement. T or F

14. The Santiago Declaration pledged Paraguay, Argentina, and Chile to a joint "international maritime policy" dedicated to the principle that each of the three possesses "sole sovereignty and jurisdiction over the area of the sea adjacent to the coast of its own country and extending not less than 200 nautical miles from the said coast." T or F

15. In its efforts to protect U.S. tuna fishermen from seizures by Ecuador, the U.S. government has
    a. issued diplomatic protests
    b. threatened to cut off foreign aid
    c. offered to submit the dispute to the International Court of Justice
    d. all of the above

16. The Fisherman's Protection Act of 1954 and 1967 was amended by the Fishery Conservation and Management Act of 1976. T or F

17. One of the issues considered by the Third U.S. Conference on the Law of the Sea is
    a. crew training on commercial fishery vessels
    b. seabed mining
    c. satellite navigation
    d. a and c

18. Naval planners fear that extensions of jurisdiction and closures of straits will hamper the mobility of naval forces. T or F

19. Ambassador Elliot Richardson proclaimed the resources of the seabed to be "the common heritage of mankind" in a famous speech in September of 1967. T or F

20. The enclosure movement as exemplified by the 200 mile economic zone concept, benefits a relatively small number of states with long shorelines. T or F

21. The International Court of Justice became involved in fisheries zones when it decided a case involving
    a. Brazil and France
    b. Ecuador and the U.S.
    c. Canada and Norway
    d. England and Iceland

22. The Soviet Union has recently proposed that there be a distance limit of 300 nautical miles on national rights to seabed resources. T or F

23. The North Sea Continental Shelf Cases involved a dispute between England and Norway over North Sea oil and gas T or F

24. Since no treaty has yet been agreed upon, it is likely that the U.N. Conference on Law of the Sea will not have much of an impact on the future development of international law. T or F

25. Since the Law of the Sea Conference began in 1974, approximately 65 of the world's 130 coastal states have declared 50 mile resource zones of one type or another. T or F

TOPIC: Objective Examination Key - History - F.C.M.A.

CHRONOLOGY: To be administered after consideration of the section; on approximately the _____day.

DURATION: 40 minutes

ACCEPTABLE PERFORMANCE LEVEL 85% (3 wrong)

STUDENT NO: _____

EXAM GRADE: _____

DIRECTIONS: Answer all of the questions below in the manner indicated (i.e. multiple choice, short answer-true or false, etc.) Work as rapidly as possible. All parts of a question must be answered correctly.

International Law and U.S. Extended Jurisdiction

1. The Dutch scholar Hugo Grotius was the most celebrated advocate of the concept of the "dominion of the seas". T or (F)

2. The first nation to claim a 200 mile fisheries management zone was:
   a. Peru
   b. Ecuador
   (c) Chile
   d. Paraguay

3. Ecuador's seizure of U.S. shrimp trawlers was a source of friction between the U.S. and Ecuador for over 20 years. T or (F)

4. The Declaration of Santiago was made by a group of U.S. fishermen whose vessels had been seized by Chile in 1952. T or (F)

5. The Fishermen's Protective Act of 1954
   a. extended Jones Act protection to fishermen
   b. extended U.S. fishery management to 12 miles from shore
   c. prevented foreign factory fleets from fishing above the U.S. continental shelf
   (d) none of the above

6. The Declaration of Panama created a joint maritime policy for Panama, Ecuador, and Chile. T or (F)

7. The Truman Proclamations of 1945

   a. Firmly established the U.S. 3 mile limit.
   (b) began the movement towards extended resource zones
   c. maintained the neutrality of North and South American coastal waters.
   d. established a compensation scheme for U.S. fishermen.

8. The Chilean whaling industry is indirectly responsible for the U.S. 200 mile fishery conservation and management zones. (T) or F

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10. U.S. tuna fishermen have been assisted by

    a. the Fishermen's Protection Act of 1954.
    b. the Declaration of Santiago
    (c) a and d
    d. the Fishery Conservation and Management Act of 1976.

11. The concept of freedom of the seas was promoted by

    a. John Seldon
    b. Pope Pius
    (c) Hugo Grotius
    d. a and d

12. The Third United Nations Conference on the Law of the Sea is only involved with the issue of deep seabed mining. T or (F)

13. The ICNAF has become a binding agreement in international law and has limited the growth of the enclosure movement. T or (F)

14. The Santiago Declaration pledged Paraguay, Argentina, and Chile to a joint "international maritime policy" dedicated to the principle that each of the three possesses "sole sovereignty and jurisdiction over the area of the sea adjacent to the coast of its own country and extending not less than 200 nautical miles from the said coast." T or (F)

15. In its efforts to protect the U.S. tuna fisherman from seizures by Ecuador, the U.S. government has

    a. issued diplomatic protests
    b. threatened to cut off foreign aid
    c. offered to submit the dispute to the International Court of Justice
    (d) all of the above

16. The Fisherman's Protection Act of 1954 and 1967 was amended by the Fishery Conservation and Management Act of 1976. (T) or F

17. One of the issues considered by the Third U.S. Conference on the Law of the Sea is
    a. crew training on commercial fishery vessels
    (b) seabed mining
    c. satellite navigation
    d. a and c

18. Naval planners fear that extensions of jurisdiction and closures of straits will hamper the mobility of naval forces. (T) or F

19. Ambassador Elliot Richardson proclaimed the resources of the seabed to be "the common heritage of mankind" in a famous speech in September of 1967. T or (F)

20. The enclosure movement as exemplified by the 200 mile economic zone concept, benefits a relatively small number of states with long shorelines. (T) or F

21. The International Court of Justice became involved in fisheries zones when it decided a case involving
    a. Brazil and France
    b. Ecuador and the U.S.
    c. Canada and Norway
    (d) England and Iceland

22. The Soviet Union has recently proposed that there be a distance limit of 300 nautical miles on national rights to seabed resources. (T) or F

23. The North Sea Continental Shelf Cases involved a dispute between England and Norway over North Sea oil and gas. T or (F)

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25. Since the Law of the Sea Conference began in 1974, approximately 65 of the world's 130 coastal states have declared 50 mile resource zones of one type or another. T or (F)

LABORATORY EXERCISES

Instructor's Directions

The laboratory exercises in the curriculum have been designed to afford the student practice in a correct and efficient technique that is applicable to field sampling and data recording. Each section builds upon the preceding section, and as such, is an important learning experience.

It is essential that the proper laboratory skills are developed in the beginning of the training. Students should learn to work independently, and the emphasis should be placed upon correct procedure, following directions, and utilizing the proper equipment. It is the responsibility of the instructor that the procedure for each exercise is clearly explained and demonstrated to the students.

The biological training curriculum has been developed for a "hands on" practical application. It is essential that a complete species collection of marine fish and invertebrates considered under the 200 Mile Limit legislation as well as other marine species of the Northwest Atlantic region, be available for the laboratory exercises. This is a valuable resource for the training regime and mandates the acquisition of a preserved collection and a continuous supply of fresh specimens. These can be collected by the instructor and/or obtained at a local fishing port.

A constant reenforcement of identifying and sampling from identical species as will be encountered during the observer's tour of duty is perhaps one of the most important aspects of the curriculum and certainly its strength. A list of species or species groupings have been included in the instructor's directions for the laboratory exercise. Along this same line of reasoning, it is suggested that the same biological sampling equipment used by the fisheries observers should be used in the laboratory exercises.

The sampling techniques, data acquisition, and recording regimes are those required by the National Marine Fisheries Service and taken from the Observer Manual Part II - Biological Sampling. A continuity between the existing observer program and NMFS requirements and this training curriculum was a primary consideration. A duplication in effort of the excellent work done by the personnel at the Woods Hole Oceanographic Institute would be counter-productive to the purpose of the curriculum. It is felt that reenforcement and practice will facilitate the learning and retention of the various sampling requirements when in the field.

The students will complete the laboratory exercises at different times, therefore, the instructor should be prepared to correct the questions and activities of each lab exercise on an individual basis. The answers to the questions should be placed alongside the completed labelled specimen for the rest of the students' perusal and benefit.

Time should be alloted during the latter part of the lab period so that students may avail themselves of the completed specimens of their colleagues and the demonstration specimens. The students should be held responsible for a familiarity with all of the specimens in the collection. Because of the constraints of a brief training period, this will necessitate some independent and extra work on their part.

The students should be required to keep a laboratory notebook containing lab exercises, exams, notes, and drawings. These notebooks should be checked periodically for accuracy by the instructor.

Laboratory practicums are scheduled at the end of each section to assess the students' grasp of the material. These will be graded, and along with the laboratory work and notebooks, a final grade for the biological section can be computed.

The biological section culminates with a field exercise aboard a domestic fishing vessel on which the students utilize their knowledge of deck operations and sampling techniques.

LABORATORY EXERCISE I - EXTERNAL ANATOMY OF MARINE FISH

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to give the student practice in working independently to identify, label, and describe external morphological structures in marine fish. This skill is an important aspect of field identification and sampling.

MATERIALS:

Marine fish specimens (fresh and preserved)
Dissecting trays and pins
Blank oaktag labels

DIRECTIONS:

The fish specimens should be grouped into several sections. A suggested list of species and groupings has been provided in the following pages. The groupings and species names should be unlabelled so that only the instructor is aware of the method of differentiation. In lieu of having specimens from each group for the students to work on, it is suggested that some groups be represented by labelled demonstrations.

Each student will choose one specimen from each group and label the structures listed below. The student is responsible for looking at other students' labelled specimens and the demonstration specimens.

STRUCTURES TO BE LABELLED:

Ventrum
Dorsum
Posterior
Anterior
Lateral
Dorsal Fin
Pectoral Fins
Pelvic Fins
Anal Fin
Caudal Fin
Caudal Peduncle
Adipose Fin
Finlets
Keels
Operculum
Lateral Line

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Draw each specimen and label the structures.
2. Give the common and scientific name of each of your specimens.
3. For each specimen, which feature do you think serves to distinguish it from the other specimens?
4. For each group, what is the main distinguishing feature?

SUGGESTED SPECIES GROUPINGS:

Group I - Sharks

Group II - Skates

Group III - Eel and Eel-Shaped Fishes

Group IV - Herring Family

Group V - Smelt and Anchovy-Shaped Fishes

Group VI - Cod Family

Group VII - Perch-Like Fishes

Group VIII - Sculpins and Sea Robins

Group IX - Flatfish

Group X - Mackerel Family

Group XI - Billfishes

Group XII - Miscellaneous

LABORATORY EXERCISE II - INTERNAL ANATOMY OF MARINE FISH

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to give the student practice in working independently to identify, label and describe internal anatomical structures in marine fish. The exercise correlates well with field sampling of organs and the identification and reporting procedures of sexual and maturity stages.

MATERIALS:

Marine fish specimens (fresh and preserved)
Dissecting trays and pins
Dissecting kits; forceps and surgical scissors
Blank oaktag labels

DIRECTIONS:

It is suggested that the fish specimens be grouped with consideration given to carnivores, plankton-feeders, those possessing swim bladders, and those without swim bladders. Species should be collected at different times of the year and preserved so that a distribution of individuals in different sexual and maturity stages will be available to the students. In the event that there is a problem in obtaining enough species to represent these stages, it is important that you have demonstration specimens in the laboratory. The groups of specimens should be unlabelled as to their differentiation, so that only the instructor is aware of the method of segregation. A suggested list of groupings and species has been provided at the end of this exercise.

Please read the following cautionary note to the students before they begin to work.

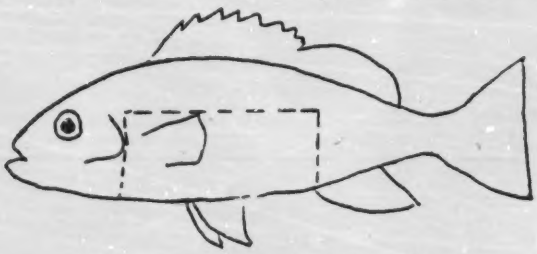
******SPECIAL INSTRUCTIONS FOR PRESERVED SPECIMENS********

If you are using a preserved fish specimen, it most likely has been preserved in a solution containing formalin, an extremely volatile substance. Be sure to wash off the surface of the fish thoroughly. Cut into the fish carefully, avoiding puncturing the internal organs.

It is common for preserved specimens to have been injected with the preserving solution and the organs will have absorbed the solution. Do not place your face close to the specimen while cutting or probing! You may cause the preserving fluid to squirt in your eye. If this happens, rinse the eye liberally with cold water. If burning persists, get medical attention immediately. Rinse the internal gut cavity with water to remove most of the preserving solution before you begin to work.

****

Each student will choose one fish from each group to dissect. When cutting into the specimen, the students should be advised to avoid puncturing the internal organs. A demonstration of the method of cutting a "window" in the lateral portion of the fish would be helpful to the students. Using surgical or dissecting scissors, a ventral belly cut from the anal pore to the operculum is first made. Next, perpendicular cuts are made behind the operculum and above the anus. A lateral cut is next made and the skin flap removed.



The student will label the internal anatomical structures listed below and extract a gill segment to mount on a cardboard and label its parts. Students are responsible for observing the labelled specimens of their colleagues and the demonstration specimens.

STRUCTURES TO BE LABELLED:

Stomach
Intestine
Pyloric Caeca
Heart
Kidney
Liver
Swim Bladder
Testis
Ovary
Gill Raker
Gill Filament

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Draw, label, and describe each fish specimen.
2. Give the common and scientific name of each of your specimens.
3. Designate the sex and maturity stage of each of your specimens.
4. Are your specimens carnivores or plankton feeders? Give several reasons for your choices.
5. Do your fish possess swim bladders? What does their presence or absence tell you about their lifestyle?
6. What type of reproduction is represented by each species?

SUGGESTED SPECIES GROUPINGS:

I. CARNIVORES

Tautog
Shark spp.
Skate spp.
Stripe Bass
Cod
Haddock
Pollock
Tomcod
Hake spp.
Flatfish
Scup

II. PLANKTON-FEEDERS

Herring
Menhaden
Alewife
Anchovy
Smelt

III. Possess Swim Bladders

Tautog
Herring
Cod
Haddock
Pollock
Toadfish
Stripe Bass
Scup

IV. No Swim Bladders

Mackerel
Tuna
Shark spp.
Skate spp.
Swordfish

LABORATORY EXERCISE III - SQUID EXTERNAL ANATOMY

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to give the student practice in identifying, labelling, and describing the external anatomical features of the squid. It is especially important that the student understand the outward body position and configuration of the squid for future field work.

MATERIALS:

Samples of squid, Loligo pealei and Ilex illacebrosus (fresh and preserved)
Dissecting trays and pins
Blank oaktag labels

DIRECTIONS:

The squid specimens should be divided into the two species groups and not labelled. Each student will choose one sample from each group and label the structures listed below.

STRUCTURES TO BE LABELLED:

Anterior Surface
Posterior Surface
Dorsal End
Ventral End
Lateral Surface
"foot region"
Arms (Posterior and Anterior)
Tentacles
Fin
Mantle
Collar
Siphon
Eye

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Give the common and scientific name of each of your specimens.

2. Draw and label each specimen.

3. What features serve to differentiate between the two species?

LABORATORY EXERCISE IV - SQUID INTERNAL ANATOMY: SEX AND MATURITY STAGE

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to give the student practice in being able to work independently to identify, label and describe the internal anatomical structures of two species of squid. This exercise is especially important for the recognition of sexual and maturity stages.

MATERIALS:

Samples of Loligo pealei and Ilex illacebrosus (fresh and preserved)
Dissecting trays and pins
Dissecting kits, forceps, surgical scissors
Blank oaktag labels

DIRECTIONS:

The squid specimens should be divided into the two species groups and not labelled. Each student will choose one sample from each group to dissect. Care should be taken when cutting into a preserved specimen. (See special instructions for preserved specimens, Lab. Exer. II). On each specimen, a cut should be made along the posterior plane to expose the internal organs. Each student should familiarize himself with the male and female reproductive organs of both species and look at his colleagues' labelled specimens if necessary. The student will label the structures listed below.

STRUCTURES TO BE LABELLED:

Siphon	Kidney	Oviduct
Mantle	Testis	Nidamental Gland
Stomach	Ovary	
Intestine	Spermatophoric Gland	
Caecum	Penis	
Ink Sac	Oviductal Gland	
Gill		

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Draw, label and describe each of your specimens. Include drawings of both sexes in your notebook.

2. Give the common and scientific names of your specimens.

3. Are your specimens male or female?

4. What is the one obvious feature that serves to distinguish the male from the female?

5. What maturity stage were your specimens in?

LABORATORY EXERCISE V - MARINE FISH IDENTIFICATION

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to acquaint the student with selected marine fish species of the Northwest Atlantic region; their common and scientific names and develop a familiarity with the use of keys for identification.

MATERIALS:

Marine fish species collection (fresh and preserved)
Dissecting trays and pins
Forceps
Probe
Bigelow and Schroeder - Fishes of the Gulf of Maine
National Marine Fisheries Service - Observer Manual key

DIRECTIONS:

A labelled collection of marine fish species (common and scientific names) of the Northwest Atlantic region will be provided for the students. In addition, a bin of unlabelled species will be available. Each student will choose two different unlabelled specimens to "key out" using the Fishes of the Gulf of Maine and Observer Manual keys. The student will be responsible for a familiarity with other students' labelled specimens and the species collection.

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Draw your two unknown species and give the common, (colloquial, if any), and scientific names.
2. What major feature serves to distinguish them?
3. To what other species are they closely related and why?
4. What are the major groups of fish represented in the species collection and what serves to differentiate them?

LABORATORY EXERCISE VI - MARINE INVERTEBRATE IDENTIFICATION

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to acquaint the student with selected marine invertebrate species of the Northwest Atlantic region; their common and scientific names and develop a familiarity with the use of keys for identification.

MATERIALS:

Marine invertebrate species collection (fresh and preserved)
Dissecting trays and pins
Forceps
Probe
Smith - Keys to Marine Invertebrates of the Woods Hole Region
National Marine Fisheries Service - Observer Manual key

DIRECTIONS:

A labelled collection of marine invertebrate species (common and scientific names), of the Northwest Atlantic region will be provided for the students. In addition, a bin of unlabelled species will be available. Each student will choose two different unlabelled specimens to "key out" using the Woods Hole and Observer Manual keys. The students will be responsible for a familiarity with other students' labelled specimens and the species collection.

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Draw your two unknown species and give the common and scientific names.

2. To what "classes" do they belong?

3. What major feature serves to differentiate them?

4. To what other species are they closely related?

5. What are the major groups of invertebrates represented in the species collection and what serves to differentiate them?

LABORATORY EXERCISE VII - LENGTH SAMPLING

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to acquaint the student with the proper methods of length measurement and permit practice for the student in measuring and recording length data with different species of fish and invertebrates.

MATERIALS:

Marine fish and invertebrate species (fresh and preserved)
Measuring board
Aluminum and/or plastic punch strips
Awl
Tape measure
Calipers

DIRECTIONS:

Several unlabelled groups of fish and invertebrate species will be made available to the students. A suggested species list has been provided at the end of the exercise. Each student will choose one fish and one invertebrate species and measure the length of each individual according to the criteria established by the National Marine Fisheries Service and included in the text material. If time permits, students should practice measuring other species of fish.

It is suggested that the instructor provide an over size copy of the Biological Sampling Log Sheet 77-02 for the students to enter their length data.

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Give the common and scientific name of each of the species measured.

2. Which measuring technique did you use for each and why?

3. Why do you think that the fork length is used for measuring herring?

4. Add your data to the rest of the class data on Biological Sampling Log Sheet 77-02.

SUGGESTED SPECIES GROUPINGS:

Group I - Sharks

Group II - Skates

Group III - Eel and Eel-Shaped Fishes

Group IV - Herring Family

Group V - Smelt and Anchovy-Shaped Fishes

Group VI - Cod Family

Group VII - Perch-Like Fishes

Group VIII - Sculpins and Sea Robins

Group IX - Flatfish

Group X - Mackerel Family

Group XI - Billfishes

Group XII - Miscellaneous

Group XIII - Mixed Invertebrates:

Squid
Crustaceans
Bivalves

LABORATORY EXERCISE XIII - ESTIMATION OF WEIGHT AND SPECIES COMPOSITION OF THE CATCH

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to give the student practice in working independently to determine the weight and species composition of a mixed basket of fish.

MATERIALS:

Marine fish and invertebrate specimens (fresh and preserved)
Portable fish checkers (wooden frames, approximately 6 ft. square)
Small, square container (approximately 1 - 1½ ft. square, 4 inches deep)
30 kg. scale
Tape measure

DIRECTIONS:

The students will be required to work in pairs for this exercise. Each group will have one basket of mixed species to sample. The students will dump the basket of fish into the checker, and using the sub-sampling technique, calculate the weight.

The student will next determine the species composition of the total basket of fish, calculate the percentage of each and the weight of each species in the total haul. The students will be expected to use the formulas and techniques given in the text.

The data should be entered on a copy of the Biological Sampling Log form 77-01 and corrected by the instructor on an individual basis as the students complete the exercise.

LABORATORY EXERCISE IX - SCALE SAMPLING

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to acquaint the student with correct procedure for sampling scales and give the student practice in sampling from different species.

MATERIALS:

Marine fish species (fresh and preserved)
Forceps
Blunt knife
Microscope
Scale envelopes

DIRECTIONS:

Several unlabelled groups of fish species will be made available to the student. A suggested list of species has been provided at the end of the exercise. Each student will choose one fish from each group and sample the scales according to the criteria established by the National Marine Fisheries Service and given in the text material. The students will observe the scales under the microscope and place them in correctly labelled envelopes.

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Draw each species' scale and give the common and scientific name.
2. What type of scale does each species possess?
3. What do you estimate to be the age of each of your specimens?

SUGGESTED SPECIES GROUPINGS:

Group I - Sharks

Group II - Herring Family

Group III - Cod Family

Group IV - Perch-Like Fish

Group V - Flatfish

Group VI - Miscellaneous Species

LABORATORY EXERCISE X - OTOLITH SAMPLING

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to acquaint the student with the correct procedure for sampling otoliths and give the student practice in the sampling of different species.

MATERIALS:

Marine fish species (fresh and preserved)
Dissection kits, forceps, surgical scissors
Fillet (boning) knife
Hacksaw/bonesaw
Microscope
Otolith envelopes

DIRECTIONS:

Several unlabelled groups of fish species will be made available to the students. A suggested species list has been provided at the end o the exercise. Each student will choose one fish from each group and extract both otoliths according to the instructions in the text material which have been established by the National Marine Fisheries Service. It is suggested that the instructor demonstrate on one specimen for the benefit of the class. Within the constraints of the laboratory time period, the students should be encouraged to practice on as many different species as possible. The students will observe the otoliths under the microscope and place them in correctly labelled envelopes.

The questions at the end of the exercise should be completed by the students during the laboratory period and corrected by the instructor on an individual basis as the students complete the exercise.

QUESTIONS:

1. Draw each species' otolith and give the common and scientific name of the species.

2. What do you estimate to be the age of each of your specimens?

SUGGESTED SPECIES GROUPINGS:

Group I - Herring Family

Group II - Cod Family

Group III - Perch-Like Fish

Group IV - Flatfish

Group V - Mackerel Family

Group VI - Miscellaneous Species

LABORATORY PRACTICUM I

INSTRUCTOR'S DIRECTIONS

TOPIC: FISH AND INVERTEBRATE ANATOMY

CHRONOLOGY: TO BE ADMINISTERED AFTER CONSIDERATION OF THE SECTION: ON APPROXIMATELY THE ___DAY.

DURATION: 50 MINUTES

ACCEPTABLE PERFORMANCE LEVEL: 85

PURPOSE:

THE PURPOSE OF THIS LABORATORY PRACTICUM IS TO ASSESS THE STUDENTS GRASP OF THE MATERIAL COVERED THUS FAR IN FISH AND INVERTEBRATE ANATOMY, SEXUAL AND MATURITY STAGES; AND THEIR ABILITY TO TRANSFER THIS KNOWLEDGE TO UNFAMILIAR SPECIES AND SPECIMENS.

MATERIALS:

MARINE FISH AND INVERTEBRATE SPECIES (FRESH AND PRESERVED)
DISSECTING TRAYS AND PINS
OAKTAG LABELS AS NEEDED

DIRECTIONS:

THE INSTRUCTOR WILL SET UP 25 STATIONS IN THE LABORATORY. STUDENTS WILL BE GIVEN 2 MINUTES TO COMPLETE THE QUESTIONS AND MOVE CONSECUTIVELY TO THE NEXT QUESTION. IT IS SUGGESTED THAT THE MAJORITY OF SPECIMENS ARE FRESH AND CONSIST OF FAMILIAR SPECIES AND ANATOMICAL STRUCTURES COVERED IN THE LABORATORY AND CLASS EXERCISES. THE CHOICE OF SPECIES AND QUESTIONS OF THE LABORATORY PRACTICUM HAS BEEN LEFT TO THE DISCRETION OF THE INSTRUCTOR AND BASED UPON THE AVAILABILITY OF SPECIMENS.

THE FOLLOWING ARE SUGGESTED QUESTIONS:

1. IDENTIFY THE PINNED STRUCTURE ABOVE.

2. WHAT IS THE FUNCTION OF THE SWIM BLADDER?

3. HOW MAY THE SWIM BLADDER OF FISH BE BENEFICIAL TO A FISHERMAN?

4. IDENTIFY THE SEX OF THE ABOVE SPECIMEN.

5. GIVE THE MATURITY STAGE OF THE ABOVE SPECIMEN.

6. DESCRIBE THE RIPE STAGE IN A FEMALE COD.

7. DESCRIBE THE MATURE - 3 STAGE OF Ilex illacebrosus.

8. WHAT CAN YOU TELL ABOUT THE LIFESTYLE OF THE FISH POSSESSING THE ABOVE GILL RAKER?

LABORATORY PRACTICUM I

TOPIC: FISH AND INVERTEBRATE ANATOMY

CHRONOLOGY: TO BE ADMINISTERED AFTER CONSIDERATION OF THE SECTION; ON APPROXIMATELY THE ___ DAY.

DURATION: 50 MINUTES

ACCEPTABLE PERFORMANCE LEVEL: 85

STUDENT NUMBER: ____

EXAM GRADE: ___

DIRECTIONS:

THERE ARE 25 STATIONS SET UP IN THE LABORATORY. YOU ARE TO BEGIN AT ONE STATION AND WORK YOUR WAY CONSECUTIVELY THROUGH THE REMAINING STATIONS. YOU WILL HAVE 2 MINUTES AT EACH STATION TO COMPLETE THE QUESTIONS OR IDENTIFY THE STRUCTURES. WHEN TIME IS CALLED, MOVE QUICKLY TO THE NEXT STATION. WHEN YOU HAVE COMPLETED THE LAST QUESTION, TURN IN YOUR ANSWER SHEET TO THE INSTRUCTOR.

ANSWER SHEET

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LABORATORY PRACTICUM II

INSTRUCTOR'S DIRECTIONS

TOPIC: FISH AND INVERTEBRATE IDENTIFICATION

CHRONOLOGY: TO BE ADMINISTERED AFTER CONSIDERATION OF THE SECTION; ON APPROXIMATELY THE ___ DAY.

DURATION: 50 MINUTES

ACCEPTABLE PERFORMANCE LEVEL: 85

PURPOSE:

THE PURPOSE OF THIS LABORATORY PRACTICUM IS TO ASSESS THE STUDENTS GRASP OF THE MATERIAL COVERED THUS FAR IN FISH AND INVERTEBRATE SPECIES IDENTIFICATION; AND THEIR ABILITY TO TRANSFER THIS KNOWLEDGE OF SPECIES CHARACTERISTICS AND THE USE OF KEYS TO IDENTIFY UNFAMILIAR SPECIES.

MATERIALS:

MARINE FISH AND INVERTEBRATE SPECIES (FRESH AND PRESERVED)
DISSECTING TRAYS AND PINS
OAKTAG LABELS AS NEEDED
BIGELOW AND SCHROEDER - FISHES OF THE GULF OF MAINE
SMITH - KEYS TO MARINE INVERTEBRATES OF THE WOODS HOLE REGION

DIRECTIONS:

THE INSTRUCTOR WILL SET UP 25 STATIONS IN THE LABORATORY. STUDENTS WILL BE GIVEN 2 MINUTES TO COMPLETE THE QUESTIONS AND MOVE CONSECUTIVELY TO THE NEXT QUESTION. IT IS SUGGESTED THAT THE MAJORITY OF SPECIMENS ARE FRESH AND CONSIST OF FAMILIAR SPECIES COVERED IN THE LABORATORY AND CLASS EXERCISES. THE LAST THREE STATIONS SHOULD CONSIST OF THREE UNFAMILIAR SPECIES OF WHICH THE STUDENTS WILL BE REQUIRED TO "KEY OUT" USING BIGELOW AND SCHROEDER AND SMITH. THE CHOICE OF SPECIES AND QUESTIONS OF THE LABORATORY PRACTICUM HAS BEEN LEFT TO THE DISCRETION OF THE INSTRUCTOR AND BASED UPON THE AVAILABILITY OF SPECIMENS.

THE FOLLOWING ARE SUGGESTED QUESTIONS:

1. TO WHICH "GROUP" DOES THE ABOVE SPECIES BELONG?

2. TO WHICH "CLASS" DOES THE ABOVE SPECIES BELONG?

3. WHAT IS THE SCIENTIFIC, COMMON AND COLLOQUIAL NAME?

4. TO WHICH OTHER SPECIES IS THE ABOVE FISH CLOSELY RELATED?

LABORATORY PRACTICUM II

TOPIC: FISH AND INVERTEBRATE IDENTIFICATION

CHRONOLOGY: TO BE ADMINISTERED AFTER CONSIDERATION OF THE SECTION; ON APPROXIMATELY THE ___ DAY.

DURATION: 50 MINUTES

ACCEPTABLE PERFORMANCE LEVEL: 85

STUDENT NUMBER: ____

EXAM GRADE: _____

DIRECTIONS:

THERE ARE 25 STATIONS SET UP IN THE LABORATORY. YOU ARE TO BEGIN AT ONE STATION AND WORK YOUR WAY CONSECUTIVELY THROUGH THE REMAINING STATIONS. YOU WILL HAVE 2 MINUTES AT EACH STATION TO COMPLETE THE QUESTIONS OR IDENTIFY THE SPECIES. THE LAST THREE STATIONS WILL REQUIRE YOU TO "KEY OUT" THREE SPECIES USING PIGELOW AND SCHROEDER - FISHES OF THE GULF OF MAINE AND SMITH - KEYS TO MARINE INVERTEBRATES OF THE WOODS HOLE REGION. WHEN TIME IS CALLED, MOVE QUICKLY TO THE NEXT STATION. WHEN YOU HAVE COMPLETED THE LAST QUESTION, TURN IN YOUR ANSWER SHEET TO THE INSTRUCTOR.

ANSWER SHEET

1. _____
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LABORATORY PRACTICUM III

INSTRUCTOR'S DIRECTIONS

TOPIC: BIOLOGICAL SAMPLING AND DATA RECORDING

CHRONOLOGY: TO BE ADMINISTERED AFTER CONSIDERATION OF THE SECTION; ON APPROXIMATELY THE ___DAY.

DURATION: 50 MINUTES

ACCEPTABLE PERFORMANCE LEVEL: 85

PURPOSE:

THE PURPOSE OF THIS LABORATORY PRACTICUM IS TO ASSESS THE STUDENTS GRASP OF THE MATERIAL COVERED THUS FAR IN BIOLOGICAL SAMPLING AND DATA RECORDING.

MATERIALS:

MARINE FISH AND INVERTEBRATE SPECIES (FRESH AND PRESERVED)
SCALE AND OTOLITH SAMPLES
DISSECTING TRAYS AND PINS
OAKTAG LABELS AS NEEDED
MEASURING BOARDS
ALUMINUM AND PLASTIC PUNCH STRIPS
AWLS
CALIPERS
BIOLOGICAL SAMPLING LOG SHEETS
MICROSCOPES

DIRECTIONS:

THE INSTRUCTOR WILL SET UP 25 STATIONS IN THE LABORATORY. STUDENTS WILL BE GIVEN 2 MINUTES TO COMPLETE THE QUESTIONS AND MOVE CONSECUTIVELY TO THE NEXT QUESTION. IT IS SUGGESTED THAT THE MAJORITY OF THE SPECIMENS ARE FRESH AND CONSIST OF THE SPECIES COVERED UNDER THE BIOLOGICAL SAMPLING SECTION. THE CHOICE OF SPECIES AND QUESTIONS HAS BEEN LEFT TO THE DISCRETION OF THE INSTRUCTOR AND BASED UPON THE AVAILABILITY OF SPECIMENS.

THE FOLLOWING ARE SUGGESTED TO BE INCLUDED IN THE PRACTICUM.

1. SPECIES IDENTIFICATION.

2. LENGTH MEASUREMENT.

3. WEIGHT DETERMINATION

4. MICROSCOPE SET-UPS OF SCALES AND OTOLITHS FOR THE STUDENTS TO IDENTIFY TYPES AND DETERMINE AGES.

5. SEX AND MATURITY IDENTIFICATION AND REPORTING.

6. QUESTIONS PERTINANT TO FILING OUT THE BIOLOGICAL SAMPLING LOG SHEETS.

7. REGULATION AND REGIMES OF SAMPLING.

8. IDENTIFICATION OF EQUIPMENT.

LABORATORY PRACTICUM III

TOPIC: BIOLOGICAL SAMPLING AND DATA RECORDING

CHRONOLOGY: TO BE ADMINISTERED AFTER CONSIDERATION OF THE SECTION; ON APPROXIMATELY THE ___DAY.

DURATION: 50 MINUTES

ACCEPTABLE PERFORMANCE LEVEL: 85

STUDENT NUMBER: ____

EXAM GRADE: ____

DIRECTIONS:

THERE ARE 25 STATIONS SET UP IN THE LABORATORY. YOU ARE TO BEGIN AT ONE STATION AND WORK YOUR WAY CONSECUTIVELY THROUGH THE REMAINING STATIONS. YOU WILL HAVE 2 MINUTES AT EACH STATION TO COMPLETE THE QUESTIONS. WHEN TIME IS CALLED, MOVE QUICKLY TO THE NEXT STATION. WHEN YOU HAVE COMPLETED THE LAST QUESTION, TURN IN YOUR ANSWER SHEET TO THE INSTRUCTOR.

ANSWER SHEET

1. _____ 14. _____

2. _____ 15. _____

3. _____ 16. _____

4. _____ 17. _____

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FIELD EXERCISE

INSTRUCTOR'S DIRECTIONS

PURPOSE:

The purpose of this exercise is to simulate the observer sampling activities in the environs of a working fishing vessel.

MATERIALS:

Observer biological sampling kit
Biological sampling log sheets
Foul weather gear

DIRECTIONS:

The class will be working on the deck of a fishing vessel. It may be preferable to split the class into two or more groups for this activity, depending upon the size of the vessel used. Each student will be assigned a particular species to sample and duties to perform.

The students should be cautioned and reminded of safety procedures to be observed while on a fishing vessel. It is essential that they keep well away from gear and machinery. When the net comes on board, they should wait until the cod end is dumped before approaching the pen area.

The students will fill their baskets with the species they are assigned to sample and complete the following activities:

1. Identify the species.
2. Determine the weight, length frequency, sex, maturity stage.
3. Fill out the log sheet.
4. Sample for scales and otoliths as applicable.
5. Note any irregularity or abnormality of the haul.

The instructor will observe the students' activity during the field exercise and their accuracy in data recording on the log sheets. Together these two indices will be used to assess the students' performance on the field exercise and be included in the final grade determination.